

Nokia Mobile Phones
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02.02.01

There is a need for Midi content that can be applied in a coherent way by devices that have different capabilities, without the need for optimisation. It should be possible for the content creators to predict how a given Midi song is going to sound in the various devices. This is not the case with the current proposed standard, at least for two reasons. There are big differences between the various GM bank implementations because of e.g. different synthesis technologies. In mobile devices the limitations of the small transducers add further variation to the final sound of a given Midi song.

To support the creation of more predictable content, we propose an instrument bank with reduced amount of instruments. The proposed solution is a subset of GM instruments that only includes the most generic and descriptive instruments. This subset is associated with a mapping practice that connects all GM instrument program numbers to the instruments in the reduced set. The mapping supports GM compatibility both upwards and downwards.

The method for structuring the bank is the following. Full GM bank is divided into groups of instruments that share significant characteristics in timbre, envelope, and musical function. The idea is that the instruments in a given group can replace each others without major effects to the basic musical feel of the song. The most generic instrument from each group is then selected to replace the other instruments in the same group.

The boundaries of the traditional GM grouping are crossed in cases where similarities exist between instruments from different GM groups. For example, in terms of timbre and envelope, guitar and banjo are more similar to each others than banjo and bagpipe, although guitar and banjo belong to different GM groups while banjo and bagpipe belong to the same GM group.

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Table 1. Melodic instrument groups

The first instrument in each group can be used to replace the rest of the instruments.

MIDI # Patch name

1	Acoustic Piano
2	Bright Acoustic Piano
3	Electric Grand Piano
4	Honky-tonk Piano
5	Electric Piano1
6	Electric Piano 2
7	Harpsichord
8	Clavi

MIDI # Patch name

12	Vibraphone
9	Celesta
10	Glockenspiel
11	Music Box
13	Marimba
14	Xylophone
15	Tubular Bells
16	Dulcimer
47	Orchestral Harp
109	Kalimba

MIDI # Patch name

17	Drawbar Organ
18	Percussive Organ
19	Rock Organ
20	Church Organ
21	Reed Organ
22	Accordion
23	Harmonica
24	Tango Accordion
56	Orchestra Hit
110	Bag pipe

MIDI # Patch name

28	Electric Guitar (clean)
25	Acoustic Guitar (nylon)
26	Acoustic Guitar (steel)
27	Electric Guitar (jazz)
29	Electric Guitar (muted)
30	Overdriven Guitar
31	Distortion Guitar
32	Guitar Harmonics
105	Sitar
106	Banjo
107	Shamisen
108	Koto

34	Electric Bass (finger)
33	Acoustic Bass
35	Electric Bass (pick)
36	Fretless Bass
37	Slap Bass 1
38	Slap Bass 2
39	Synth Bass 1
40	Synth Bass 2

41	Violin
42	Viola
43	Cello
44	Contrabass
46	Pizzicato Strings
111	Fiddle

49	Strings
45	Tremolo Strings
50	String Ensembles 2
51	Synth Strings 1
52	Synth Strings 2

57	Trumpet
58	Trombone
59	Tuba
60	Muted Trumpet
61	French Horn
62	Brass Section
63	Synth Brass 1
64	Synth Brass 2

67	Tenor Sax
65	Soprano Sax
66	Alto Sax
68	Baritone Sax
112	Shanai

74	Flute
69	Oboe
70	English Horn
71	Bassoon
72	Clarinet
73	Piccolo
75	Recorder
76	Pan Flute
77	Blown Bottle
78	Shakuhachi
79	Whistle
80	Ocarina

82	Lead (Saw)
81	Lead 1 (square)
83	Lead 3 (calliope)
84	Lead 4 (chiff)
85	Lead 5 (charang)
86	Lead 6 (voice)
87	Lead 7 (fifths)
88	Lead 8 (bass +lead)

90	Pad
53	Choir Aahs
54	Voice Ooohs
55	Synth Voice
89	Pad 1 (new age)
91	Pad 3 (polysynth)
92	Pad 4 (choir)
93	Pad 5 (bowed)
94	Pad 6 (metallic)
95	Pad 7 (halo)
96	Pad 8 (sweep)

115	Pitched Percussion
48	Timpani
113	Tinkle Bell
114	Agogo
116	Woodblock
117	Taiko Drum
118	Melodic Tom
119	Synth Drum

125	Telephone
97	FX 1 (rain)
98	FX 2 (soundtrack)
99	FX 3 (crystal)
100	FX 4 (atmosphere)
101	FX 5 (brightness)
102	FX 6 (goblins)
103	FX 7 (echoes)
104	FX 8 (sci-fi)
120	Reverse Cymbal
121	Guitar Fret Noise
122	Breath Noise
123	Seashore
124	Bird Tweet
126	Helicopter
127	Applause
128	Gunshot

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Table 2. Percussive instrument groups

The first instrument in each group can be used to replace the rest of the instruments.

Key Key # Sound name

B2	36	Bass drum
	35	Acoustic Bass Drum

E2	40	Electric Snare
	38	Acoustic Snare

F#2	42	Closed Hihat
	44	Pedal Hi-hat [EXC1]
	71	Short Whistle [EXC2]
	80	Mute Triangle [EXC5]

Bb2	46	Open Hihat
	55	Splash Cymbal
	58	Vibra-slap
	74	Long Guiro [EXC3]
	81	Open Triangle [EXC5]
	72	Long Whistle [EXC2]

D3	50	High Tom
	48	High Mid Tom

A2	45	Low Tom
	43	High Floor Tom
	41	Low Floor Tom
	47	Low-Mid Tom

C#3	49	Crash
	57	Crash Cymbal 2

Key Key # Sound name

D#3	51	Ride
	52	Chinese Cymbal
	53	Ride Bell

F#3	54	Tambourine
	39	Hand Clap

D4	62	Mute High Conga
	60	High Bongo
	65	High Timbale
	78	Mute Cuica [EXC4]

E4	64	Low Conga
	61	Low Bongo
	63	Open Hi Conga
	66	Low Timbale
	79	Open Cuica [EXC4]

Bb4	70	Maracas
	69	Cabasa
	73	Short Guiro [EXC3]

D#5	75	Claves
	37	Side stick
	56	Cowbell
	67	High Agogo
	68	Low Agogo
	76	High Wood Block
	77	Low Wood Block

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Table 3. Melodic instrument list

All melodic GM instruments with the proposed mapping.

Patch #	Patch name	->	Patch #	Patch name	->	Patch #	Patch name
1	Acoustic Grand Piano	1	Acoustic Grand Piano	65	Soprano Sax	67	Tenor Sax
2	Bright Acoustic Piano	1	Acoustic Grand Piano	66	Alto Sax	67	Tenor Sax
3	Electric Grand Piano	1	Acoustic Grand Piano	67	Tenor Sax	67	Tenor Sax
4	Honky-tonk Piano	1	Acoustic Grand Piano	68	Baritone Sax	67	Tenor Sax
5	Electric Piano1	1	Acoustic Grand Piano	69	Oboe	74	Flute
6	Electric Piano 2	1	Acoustic Grand Piano	70	English Horn	74	Flute
7	Harpsichord	1	Acoustic Grand Piano	71	Bassoon	74	Flute
8	Clavi	1	Acoustic Grand Piano	72	Clarinet	74	Flute
9	Celesta	12	Vibraphone	73	Piccolo	74	Flute
10	Glockenspiel	12	Vibraphone	74	Flute	74	Flute
11	Music Box	12	Vibraphone	75	Recorder	74	Flute
12	Vibraphone	12	Vibraphone	76	Pan Flute	74	Flute
13	Marimba	12	Vibraphone	77	Blown Bottle	74	Flute
14	Xylophone	12	Vibraphone	78	Shakuhachi	74	Flute
15	Tubular Bells	12	Vibraphone	79	Whistle	74	Flute
16	Dulcimer	12	Vibraphone	80	Ocarina	74	Flute
17	Drawbar Organ	17	Drawbar Organ	81	Lead 1 (square)	82	Lead 2 (sawtooth)
18	Percussive Organ	17	Drawbar Organ	82	Lead 2 (sawtooth)	82	Lead 2 (sawtooth)
19	Rock Organ	17	Drawbar Organ	83	Lead 3 (calliope)	82	Lead 2 (sawtooth)
20	Church Organ	17	Drawbar Organ	84	Lead 4 (chiff)	82	Lead 2 (sawtooth)
21	Reed Organ	17	Drawbar Organ	85	Lead 5 (charang)	82	Lead 2 (sawtooth)
22	Accordion	17	Drawbar Organ	86	Lead 6 (voice)	82	Lead 2 (sawtooth)
23	Harmonica	17	Drawbar Organ	87	Lead 7 (fifths)	82	Lead 2 (sawtooth)
24	Tango Accordion	17	Drawbar Organ	88	Lead 8 (bass + lead)	82	Lead 2 (sawtooth)
25	Acoustic Guitar (nylon)	28	Electric Guitar (clean)	89	Pad 1 (new age)	90	Pad 2 (warm)
26	Acoustic Guitar (steel)	28	Electric Guitar (clean)	90	Pad 2 (warm)	90	Pad 2 (warm)
27	Electric Guitar (jazz)	28	Electric Guitar (clean)	91	Pad 3 (polysynth)	90	Pad 2 (warm)
28	Electric Guitar (clean)	28	Electric Guitar (clean)	92	Pad 4 (choir)	90	Pad 2 (warm)
29	Electric Guitar (muted)	28	Electric Guitar (clean)	93	Pad 5 (bowed)	90	Pad 2 (warm)
30	Overdriven Guitar	28	Electric Guitar (clean)	94	Pad 6 (metallic)	90	Pad 2 (warm)
31	Distortion Guitar	28	Electric Guitar (clean)	95	Pad 7 (halo)	90	Pad 2 (warm)
32	Guitar Harmonics	28	Electric Guitar (clean)	96	Pad 8 (sweep)	90	Pad 2 (warm)
33	Acoustic Bass	34	Electric Bass (finger)	97	FX 1 (rain)	125	Telephone
34	Electric Bass (finger)	34	Electric Bass (finger)	98	FX 2 (soundtrack)	125	Telephone
35	Electric Bass (pick)	34	Electric Bass (finger)	99	FX 3 (crystal)	125	Telephone
36	Fretless Bass	34	Electric Bass (finger)	100	FX 4 (atmosphere)	125	Telephone
37	Slap Bass 1	34	Electric Bass (finger)	101	FX 5 (brightness)	125	Telephone
38	Slap Bass 2	34	Electric Bass (finger)	102	FX 6 (goblins)	125	Telephone
39	Synth Bass 1	34	Electric Bass (finger)	103	FX 7 (echoes)	125	Telephone
40	Synth Bass 2	34	Electric Bass (finger)	104	FX 8 (sci-fi)	125	Telephone
41	Violin	41	Violin	105	Sitar	28	Electric Guitar (clean)
42	Viola	41	Violin	106	Banjo	28	Electric Guitar (clean)
43	Cello	41	Violin	107	Shamisen	28	Electric Guitar (clean)
44	Contrabass	41	Violin	108	Koto	28	Electric Guitar (clean)
45	Tremolo Strings	49	String Ensembles 1	109	Kalimba	12	Vibraphone
46	Pizzicato Strings	41	Violin	110	Bag pipe	17	Drawbar Organ
47	Orchestral Harp	12	Vibraphone	111	Fiddle	41	Violin
48	Timpani	115	Steel Drums	112	Shanai	67	Tenor Sax
49	String Ensembles 1	49	String Ensembles 1	113	Tinkle Bell	115	Steel Drums
50	String Ensembles 2	49	String Ensembles 1	114	Agogo	115	Steel Drums
51	Synth Strings 1	49	String Ensembles 1	115	Steel Drums	115	Steel Drums
52	Synth Strings 2	49	String Ensembles 1	116	Woodblock	115	Steel Drums
53	Choir Aahs	90	Pad 2 (warm)	117	Taiko Drum	115	Steel Drums
54	Voice Oohs	90	Pad 2 (warm)	118	Melodic Tom	115	Steel Drums
55	Synth Voice	90	Pad 2 (warm)	119	Synth Drum	115	Steel Drums
56	Orchestra Hit	17	Drawbar Organ	120	Reverse Cymbal	125	Telephone
57	Trumpet	57	Trumpet	121	Guitar Fret Noise	125	Telephone
58	Trombone	57	Trumpet	122	Breath Noise	125	Telephone
59	Tuba	57	Trumpet	123	Seashore	125	Telephone
60	Muted Trumpet	57	Trumpet	124	Bird Tweet	125	Telephone

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Table 4. Percussive instrument list

All percussive GM instruments with the proposed mapping

Key #	Sound name	->	Key #	Sound name	Key #	Sound name	->	Key #	Sound name
35	Acoustic Bass Drum		36	Bass Drum 1	59	Ride Cymbal 2		51	Ride Cymbal 1
36	Bass Drum 1		36	Bass Drum 1	60	High Bongo		62	Mute Hi Conga
37	Side stick		75	Claves	61	Low Bongo		64	Low Conga
38	Acoustic Snare		40	Electric Snare	62	Mute Hi Conga		62	Mute Hi Conga
39	Hand Clap		54	Tambourine	63	Open Hi Conga		64	Low Conga
40	Electric Snare		40	Electric Snare	64	Low Conga		64	Low Conga
41	Low Floor Tom		45	Low Tom	65	High Timbale		62	Mute Hi Conga
42	Closed Hi-hat [EXC1]		42	Closed Hi-hat [EXC1]	66	Low Timbale		64	Low Conga
43	High Floor Tom		45	Low Tom	67	High Agogo		75	Claves
44	Pedal Hi-hat [EXC1]		42	Closed Hi-hat [EXC1]	68	Low Agogo		75	Claves
45	Low Tom		45	Low Tom	69	Cabasa		70	Maracas
46	Open Hi-hat [EXC1]		46	Open Hi-hat [EXC1]	70	Maracas		70	Maracas
47	Low-Mid Tom		45	Low Tom	71	Short Whistle [EXC2]		42	Closed Hi-hat [EXC1]
48	High Mid Tom		50	High Tom	72	Long Whistle [EXC2]		46	Open Hi-hat [EXC1]
49	Crash Cymbal 1		49	Crash Cymbal 1	73	Short Guiro [EXC3]		70	Maracas
50	High Tom		50	High Tom	74	Long Guiro [EXC3]		46	Open Hi-hat [EXC1]
51	Ride Cymbal 1		51	Ride Cymbal 1	75	Claves		75	Claves
52	Chinese Cymbal		51	Ride Cymbal 1	76	High Wood Block		75	Claves
53	Ride Bell		51	Ride Cymbal 1	77	Low Wood Block		75	Claves
54	Tambourine		54	Tambourine	78	Mute Cuica [EXC4]		62	Mute Hi Conga
55	Splash Cymbal		46	Open Hi-hat [EXC1]	79	Open Cuica [EXC4]		64	Low Conga
56	Cowbell		75	Claves	80	Mute Triangle [EXC5]		42	Closed Hi-hat [EXC1]
57	Crash Cymbal 2		49	Crash Cymbal 1	81	Open Triangle [EXC5]		46	Open Hi-hat [EXC1]
58	Vibra-slap		46	Open Hi-hat [EXC1]					